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**ANALYTICAL CHEMISTRY AND SPECTROGRAPHY
AS ESSENTIAL CONTROLS
FOR DEVELOPMENT AND PRODUCTION
IN THE MINERAL AND METAL INDUSTRIES**

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ANALYTICAL CHEMISTRY AND SPECTROGRAPHY AS ESSENTIAL CONTROLS FOR DEVELOPMENT AND PRODUCTION IN THE MINERAL AND METAL INDUSTRIES

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SUMMARY

1. The development of analytical chemistry as related to the mining and metallurgical industries over the last two decades is reviewed briefly.
2. The development of a mineral and metal industry falls into three phases:
 - (a) discovery and mining of ore deposits;
 - (b) development of processes for extracting the valuable minerals and metals; and
 - (c) their economic production based on the work done in (b).
3. All phases require analytical control, with the highest skills and most sophisticated instrumentation required for phases (a) and (b). Obviously, it would be a vital part of the development to select the analytical methods that could be performed with the simpler, more rugged instruments whenever possible for the production phase. In fact modern plants should be designed, whenever possible to include in-stream analytical systems so as to have a continuous record of the quality of the ingredients and products.
4. Modern instrumentation utilizes a wide variety of methods for performing both simple and complex analysis; and instrumentation frequently offers the only feasible approach to difficult analytical problems. Among the analytical instrumental techniques used in a

modern mineralogical and metallurgical research institution are emission spectrography, X-ray spectrometry, electron probe microanalysis, flame emission and absorption photometry, spectrophotometry and polarography. Radiochemical techniques are useful in certain problems and can be done with relatively simple and inexpensive equipment.

5. In underdeveloped areas the availability of trained and skilled personnel may be a limiting factor in the efficiency of the analytical laboratories. It is considered that the preferable approach to this problem is, firstly, to have an expert work in the country, setting up the laboratory and training those who will be engaged in the analytical work; secondly, the most promising of these should be sent to the country of the foreign expert for advanced study and training.